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10/589,639	08/16/2006	Toshio Isozaki	294568US0PCT	2292
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OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER				
LACLAIR, DARCY D				
ART UNIT		PAPER NUMBER		
4171				
NOTIFICATION DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/589,639

Applicant(s)

ISOZAKI ET AL.

Examiner

Darcy D. LaClair

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/88)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____
- Paper No(s)/Mail Date 8/16/2006

DETAILED ACTION

Claim Objections

1. Claim 2 and 8 are objected to because of the following informalities: The claim reads "(B) is a copolymer of a (poly)styrene that is polymerized in the presence or absence of a rubber-like polymer and at least one kind selected from acrylonitrile and methyl methacrylate. It is not clear what "kind" refers to. Is this intended to indicate "at least one monomer"? Claim 8 also uses the terminology "kind" and it is not clear what "kind" indicates. A more specific word is required. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1 and 2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. With regard to claim 1, the claim reads "an aromatic polycarbonate resin wherein dihydroxybiphenyl is used in a part of a divalent phenol as the raw material thereof." This wording is awkward and unclear. Is this intended to mean that dihydroxyphenol is used as a raw material in the formation of the aromatic polycarbonate resin, or is this intended to mean that the dihydroxybiphenyl is a component of a divalent phenol? For the purposes of examination, and based on the specifications and chemical merits of

this case, the first interpretation, wherein the dihydroxybiphenyl is a type of divalent phenol used in the reaction between a divalent phenol and a carbonate precursor to generate an aromatic polycarbonate.

5. With regard to claim 2, the component (B) is a copolymer of a (poly)styrene that is polymerized in the presence or absence of a rubber-like polymer. The word "like" is unclear. Is it a rubber polymer, or is it not a rubber polymer.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 5-6 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Laughner. (US 5,369,154)

3. Claim 1 requires a polycarbonate resin comprising:

(A-1) 10 to 100 mass% of an aromatic polycarbonate resin where

dihydroxybiphenyl is used in a part of a divalent phenol as the raw material

(A-2) 90 to 0 mass% of an aromatic polycarbonate resin other than (A-1)

(B) an amorphous styrene resin in mass ratio (A:B) 50:50 to 95:5

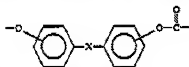
Laughner teaches a polycarbonate blend of good impact and flexural strength, which consists of component (a), polycarbonate which can be composed of an aromatic

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dihydric phenol with a carbonate precursor, or other polycarbonates, as well as (e) a rubber modified styrene/acrylonitrile copolymer up to 25% or 50%. With regard to compound (a), there are several polycarbonates taught.

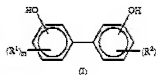
- a. With regard to applicant's A-1, Laughner teaches a first polycarbonate composed of a dihydric phenol and a carbonate precursor. As the dihydric phenol, Laughner teaches the preferred general formula (I), shown below on the left, next to applicant's formula (right)

A preferred aromatic polycarbonate is characterized by repeated units corresponding to the general formula:



wherein X is a divalent, linear or cyclic C₁-C₁₅ hydrocarbon radical, a single bond, -O-, -S-, -S₂-, -SO₂-, -SO₂-, or -CO-. Each aromatic ring may additionally contain, instead of hydrogen, up to four substituents such as C₁-C₄ alkyl hydrocarbon or alkoxy radicals, aryl or aryloxy radicals, or halo radicals.

(Laughner, col 4)



[Formula 1]

[0045] (wherein R¹ and R² represent independently a group selected from a hydrogen atom, an alkyl group having 1 to 6 carbon atoms, a cycloalkyl group having 5 to 7 carbon atoms, a substituted or unsubstituted aryl group having 6 to 12 carbon atoms and halogen atom; m and n are each an integer of 1 to 4).

(Applicant's Formula I)

For Laughner's compound, where X is a single bond and one of the hydrogens on each ring in Laughner's formula is substituted, (as Laughner indicates in the text accompanying the formula) then this formula is consistent with applicant's Formula I, once in the polymer chain. Applicant's formula displays "-OH" groups, where -O- groups are shown in Laughner's work. This merely reflects whether the structure is shown before or after being reacted with the carbonate precursor to generate a polycarbonate compound. This compound taught by Laughner constitutes a dihydroxybiphenyl used as the raw material in generating an

aromatic polycarbonate resin, and therefore meets applicant's limitation with respect to (A-1).

b. With regard to applicant's A-2, the examiner takes the position that as it requires 90% to 0% mass, the presence of this component is optional, and therefore not required.

c. With regard to applicant's amorphous styrene, Laughner additionally teaches several olefinic polymers which can contain a vinylic group (styrene) in combination with the polycarbonate. These include both styrene in combination with rubbers and without. Most similar to those compounds disclosed in applicant's specification is component (e), which is a styrene/acrylonitrile copolymer (SAN), or a rubber modified SAN copolymer, such as acrylonitrile-butadiene-styrene copolymer (ABS). (col 11 ln 35-42) The incorporation of a comonomer with styrene typically reduces the crystallinity of the styrene. Additionally, applicant's amorphous styrene is described in the specification as being ABS or other rubber modified styrene copolymers. (applicant's ¶49) An ABS copolymer therefore meets applicant's requirement for an amorphous styrene. Laughner teaches the component (e), a styrene copolymer, in a content of less than 40% by weight, with the polycarbonate component comprising 5 to 95% by weight. This constitutes 40 or fewer (to 0) mass parts of amorphous styrene to 5 to 95 mass parts of the polycarbonate. This encompasses a significant portion of the range required by applicant, 50 to 5 mass parts of amorphous styrene to 50 to 95 mass parts of polycarbonate.

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4. Claim 2 requires that the amorphous styrene resin of component (B) be a copolymer of polystyrene that is polymerized in the presence or absence of a rubber-like polymer and "at least one kind" selected from acrylonitrile and methyl methacrylate. Laughner teaches component (e) as described above. (col 11 ln 35-42) Laughner's **rubber-modified SAN** (styrene-acrylonitrile) copolymer can include monomers such as styrene, having a connecting valence on a ring carbon with groups such as **acrylonitrile**, methacrylonitrile, **methyl methacrylate**, ethyl methacrylate, and others. (col 12, ln 25-55)
5. Claim 3 requires that the polycarbonate resin (A-2) is an aromatic polycarbonate resin containing polyorganosiloxane. While applicant has not further limited the content of the (A-2) component, and it is technically not required, the examiner takes the position that by specifying the component, it is implied that it will be present in at least some amount. Laughner teaches that carbonate copolymers can be formed when a bisphenol is reacted with a carbonic acid derivative and a **polydiorganosiloxane** to yield a siloxane/carbonate block copolymer. (col 4 ln 66- col 5 ln 2) This would generate an additional polycarbonate compound not the resin of (A-1), and Laughner teaches that the various polycarbonates presented may be used as blends. (col 5 ln 21-25) This teaching allows the siloxane/carbonate block copolymer containing polydiorganosiloxane to be used in combination with the other polycarbonate resin, and teaches a combination that is consistent with the combination required by applicant.
6. Claim 5 requires an inorganic filler in an amount 1 to 20 parts by mass, with respect to 100 parts by mass of (A) and (B). Laughner teaches that fillers such as talc,

clay, or mica can be used (col 16 ln 63-65), and fillers may constitute up to 40% of the composition. (col 17 ln 1-4) This covers the range required by applicant. Additionally, Laughner indicates that these additives and their use and amount are well known in the art.

7. Claim 6 requires an impact resistance improver in an amount 1 to 15 parts by mass. Laughner teaches component (f) which is a core-shell graft polymer, (col 15-16) as an impact modifier in an amount up to 25%. (col 2 ln 50-57).

8. Claim 11 requires an injection molded article of the resin of claim 1. Laughner teaches samples prepared by injection molding. (col 17 ln 29)

9. Claim 4 is rejected under 35 U.S.C. 102(b) as being anticipated by Laughner (US 5,369,154) with support from Paul et al. (US 4,569,970)

10. Claim 4 requires that the polyorganosiloxane be a polydimethylsiloxane. Laughner teaches that a copolymer can be formed by reacting a carbonic acid derivative and a polydiorganosiloxane (col 4 ln 66-col 5 ln 5) and directs the reader to Paul et al. for a discussion of the generation of siloxane/carbonate block copolymers. Paul teaches a copolycarbonate containing 4.5% to 10% by weight of **polydimethylsiloxane**. (Paul col 5 ln 58- col 6 ln 3) Laughner has explicitly directed the reader to these compounds, indicating that these would be the ones used in this invention, and meeting the requirement of claim 4.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Laughner. (US 5,369,154) as applied to claims 1-6 above, and further in view of Laughner et al. (US 4,786,686)

13. Claim 7 requires the polycarbonate resin composition further comprises at least one kind of component (E) selected from organic alkali metal salts and organic alkaline earth metal salts in an amount 0.05 to 2 parts by mass. Laughner '154 teaches that additives can be included improve the ignition resistance of the composition (col 16 ln 54), and suggests that these additives typically do not exceed 5% by weight of the composition (col 17 ln 2). Laughner '154 fails to teach, explicitly, the addition of alkali metal salts. However in other work by the same inventor, Laughner '686, in the same art, which is improving the quality of polycarbonate (or carbonate polymers compositions), teaches the incorporation of metal salts of sulfur compounds, such as aromatic sulfonates, sulfates, and others, where the cation is preferably an alkali metal. (col 4 ln 26-59) Laughner '686 goes on to teach that the metal salt would preferably be included in amounts ranging from 0.001 to 2 percent, by weight, in order to provide resistance to the effects of burning. (col 5 ln 33-46) In both cases, the same inventor working in the same system presents polycarbonate compositions. The more recent

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art, Laughner '154, presents improvements to the polycarbonate composition, and glosses over the trivial additives, such as flame retardants, which are well known and well established in the art. The inventors own work, Laughner '686, from six years prior, presents these flame retardants, in a similar system (a polycarbonate in combination with a SAN copolymer and a impact modifier) (abs). It would have been obvious, not only for one of ordinary skill in the art, but for this specific practitioner, to have made the combination of these elements in the more recent composition, in order to realize flame retardance in the newly improved composition of Laughner '154.

14. Claim 8 requires that the component (E) is an alkali metal sulfonate, alkaline earth metal sulfonate, alkali metal polystyrene sulfonate, or alkaline earth metal polystyrene. Laughner '686 teaches aromatic sulfonates where the cation is preferably an alkali metal. (col 4 ln 26-59).

15. Claim 9 and 10 require the compositions as taught in claim 5 and claim 6, respectively, further comprising the salts (E) of claim 7. Laughner '154 fully teaches the composition, and allows for the use of a flame retardant in that composition. Laughner '686 teaches an appropriate flame retardant for use in that system, in the form of an alkali metal salts of sulfur compounds. It would be obvious to use the composition in its entirety, in combination with the flame retardant, as taught in previous work by the same inventor.

Conclusion

16. It appears that the polycarbonate resin art is a well known and thoroughly researched area, and extensive work has been performed in this area over the last 20 or more years, focusing on improving the components and combinations presented by applicant. A brief sampling of the most relevant of this work is provided. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

17. Nodera et al. (EP 1 201 715 A1) which teaches (A) 100 parts by weight of a polycarbonate resin and (B) 2 to 10 parts by weight of a core/shell type grafted rubbery elastomer. (Abs) For the polycarbonate resin, Nodera teaches that the polycarbonate may be any and every one known in the art, generally those produced from diphenols and carbonate precursors. (p.3 In 55-57) Additionally, Nodera teaches that various types of different polycarbonate resins may be mixed to give mixed polycarbonate resins for use in the invention. (p. 4 In 18-19) This constitutes the entire (A) component, which is a mixed resin of a polycarbonate containing dihydroxybiphenyl and another polycarbonate resin. For component (B), Nodera teaches a core/shell type grafted rubbery elastomer which is produced through polymerization of one or more vinylic monomers, exemplified as styrene, among others, in the presence of a rubbery polymer. (p. 4 In 34-36, 45-47, 50-52)

18. Nodera et al. (US 2004/0054045) which teaches a flame retardant composition comprising a polycarbonate resin, an aromatic vinyl resin (styrene) with a acid salt group similar to the alkali metal salt, and a reactive silicone group (siloxane).

19. Warth et al. (US 2002/0123567) which teaches a thermoplastic copolycarbonate composition which meets both (A-1) and (A-2), and contains a vinyl monomer (may be styrene.)
20. Kaufman (US 4,895,897) which teaches an aromatic carbonate composition having improved impact resistance properties and a functionalized elastomeric polymer. This provides motivation for inclusion of an alkali earth metal and siloxane compounds.
21. Nodera et al. (US 6,995,211) which teaches a flame retardant polycarbonate resin with both (A-1) and (A-2) components, as well as an aromatic vinyl resin (styrene) with an acid salt group, and a silicone compound (siloxane).
22. Laughner (US 5,270,386) which teaches a blend having vinyl aromatic copolymer (styrene), polycarbonate, impact modifiers, and conventional additives. This work constitutes a second instance in which Laughner utilizes alkali metal salts as flame retardants, and in fact incorporates the reference used above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Darcy D. LaClair whose telephone number is (571)270-5462. The examiner can normally be reached on Monday-Thursday 7:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on 571-272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Ling-Siu Choi/
Primary Examiner, Art Unit 1796

Darcy D. LaClair
Examiner
Art Unit 4171

/DDL/